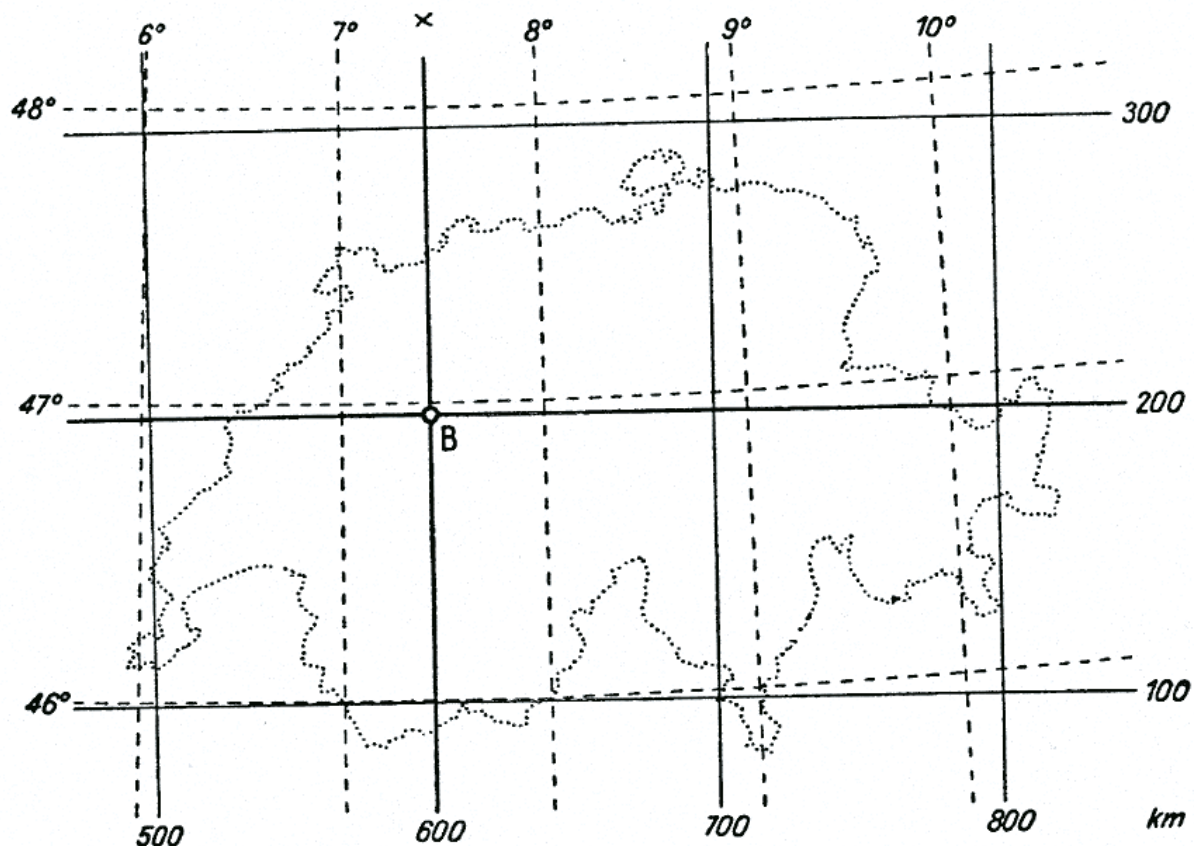


## General Information about the Swiss, German, French and Austrian Projections

### Switzerland

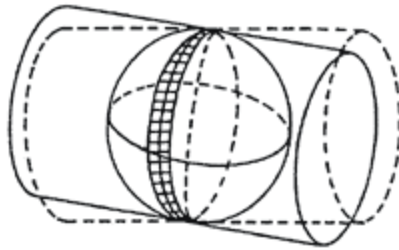
The Swiss projection is an isogonal-oblique-cylindrical projection developed by Max Rosenmund in 1903, with the Bessel ellipsoid 1841 as reference. The grid's origin is situated at the old observatory in Bern.



The unwinded cylindrical surface area forms the map surface, where the meridian of Bern is a straight line in north-south direction. It will lead to the x-axis of the orthogonal coordinate system. The y-axis is the image of the touching great circle. All other meridians and parallel circles are bent lines in this projection which is neither an equivalent projection nor a equidistant one. The isogonal-oblique-cylindrical position prevents major deformation in length as would occur in equatorial position. The point's origin was newly determined in 1938 with a width of  $46^{\circ} 57' 7.98''$  and a length of  $7^{\circ} 26' 22.335''$ . The ellipsoid's meridian is due to a varying grid convergence just identical with the cylindric meridian ( x-axis) in this particular point in Bern. In Geneva there is already a difference of  $-58'$ , in Zerne even  $1^{\circ} 55'$ .

## Germany

Their type of projection is called transversal Mercator projection or TM, also called Gauss Krüger projection system, a longitude zone system with the 1841 Bessel ellipsoid as reference. Its point of origin for Germany lays in Potsdam. The earth's surface is dispersed into stripes beginning and ending at the poles. Just those elements that can be presented without foldings, can be presented without distortion. The meridian stripes are also named belts and have a width of  $3^\circ$ , whereas the main meridians lay on  $6^\circ$ ,  $9^\circ$ ,  $12^\circ$  and  $15^\circ$  east. The rotation of  $6^\circ$  helps preventing distortions to assure a distortion free presentation as much as possible. The method is named cylindric projection, where the imaginary cylinder lays in transversal position to the earth's axis. See the following illustration for pictorial explanation:



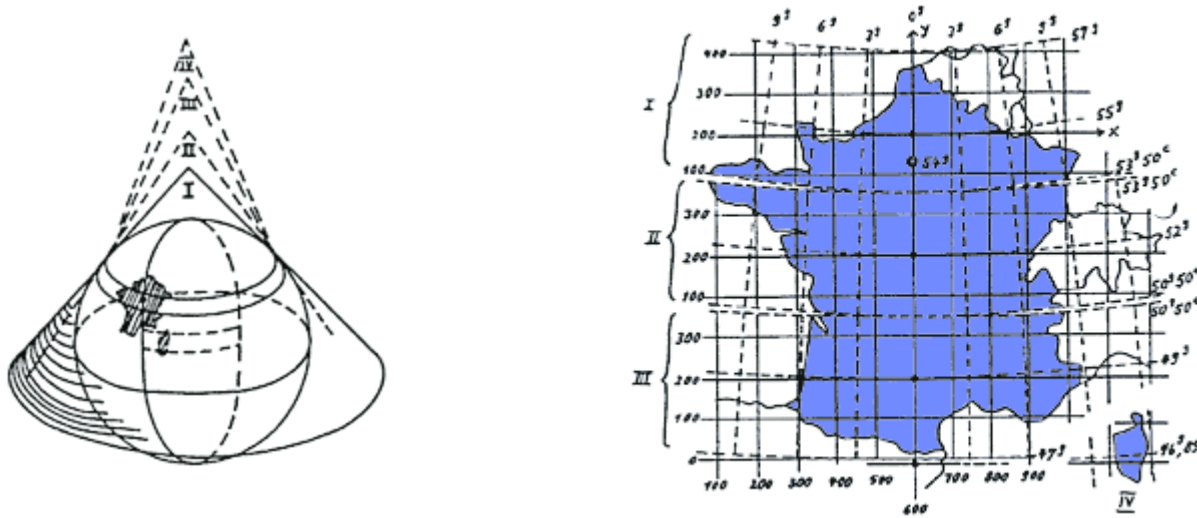
Each meridian forms its own unit. Courses and distances thence can just be measured or calculated in-between one belt. Because of the straight grid lines parallel to the main meridian of its belt, the grid line that coincides with the main meridian is the sole line in direction to geographic north. All other lines inevitably deviate from the geographic north direction. The value of northing in this Gauss Krüger projection system depicts the distance from the equator in kilometer. The value of easting exists of four digits, to be explained as follows:

- The first digit is the index number for the main meridian - the value of degree divided by 3. E.g.  $6^\circ$  divided by 3 has an outcome of 2. 2 is consequently the index number of the main meridian of  $6^\circ$ .
- The following 3 digits are depending on the coordinate difference, where 500 (km) is the value given to the main meridian and the point of interest lays either in easterly or westerly direction. E.g. 22 40 lays 500 km minus 240 km equals 260 km westerly of the main meridian of  $6^\circ$ , 37 30 lays 730 minus 500 km equals 230 km easterly of the main meridian of  $9^\circ$ .

## France

France's projection is a normal case of a conical projection, also called projection of J.H. Lambert with an equidistant circle of latitude. Its base is the ellipsoid of Clarke from 1880 measured in gon. Thereafter France has been divided up into 4 zones with the meridian's origin placed through the 'Croix du Pantheon' in Paris. The Zones are divided as follows:

- I - north, with the touching great circle at 55 gon
- II - center, with the touching great circle at 52 gon
- III - south, with the touching great circle at 49 gon
- IV - Corsica, with the touching great circle at 46.85 gon



Their middle-meridian is placed on  $2^{\circ}20'14.025''$  east of Greenwich.

## Austria

Austria has the same projection type as Germany, the Gauss Krüger projection with the Bessel ellipsoid as basis. The difference there lays in the assortment of another point of geodetic origin. They chose the Herrmannskogel, not Potsdam as Germany did.

Source: Brandenberger, CH, 2002. Kartenprojektionen, lecture notes. Institute of Cartography, ETH Zurich.